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BLEWETT FALLS LAKE, ANSON AND RICHMOND COUNTIES, NORTH CAROLINA

Pacific Northwest Environmental
Research Laboratory

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT
ON
BLEWETT FALLS LAKE
ANSON AND RICHMOND COUNTIES
NORTH CAROLINA
EPA REGION IV
WORKING PAPER No. 378

WITH THE COOPERATION OF THE
NORTH CAROLINA DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES
AND THE
NORTH CAROLINA NATIONAL GUARD

JUNE, 1975

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the North Carolina Department of Natural and Economic Resources for professional involvement and to the North Carolina National Guard for conducting the tributary sampling phase of the Survey.

Lewis R. Martin, Director of the Division of Environmental Management; Darwin L. Coburn, Chief of the Water Quality Section; and Julian R. Taylor, Supervisor of the Monitoring Program Unit; provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

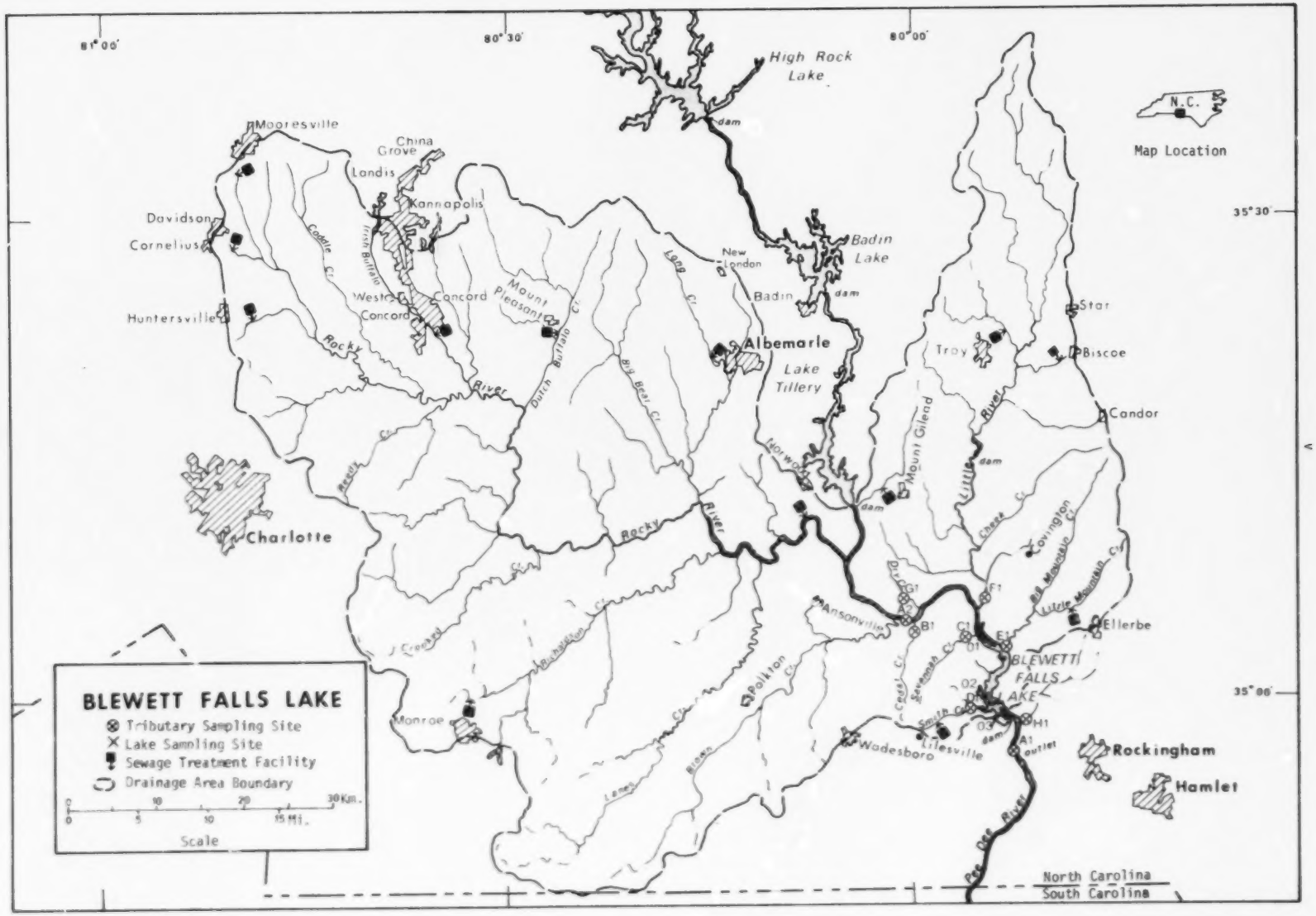
Major General William M. Buck, formerly Adjutant General of North Carolina, and Project Officer Colonel Arthur J. Bouchard, who directed the volunteer efforts of the North Carolina National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF NORTH CAROLINA

LAKE NAME	COUNTY
Badin	Montgomery, Stanly
Blewett Falls	Anson, Richmond
Chatuge	Clay, NC; Towns, GA
Fontana	Graham, Swain
Hickory	Alexander, Caldwell, Catawba
High Rock	Davidson, Rowan
Hiwassee	Cherokee
James	Burke, McDowell
John H. Kerr (Nut Bush Creek)	Granville, Vance, Warren, NC; Halifax, Mecklenburg, VA
Junaluska	Haywood
Lookout Shoals	Alexander, Catawba, Iredell
Mountain Island	Gaston, Mecklenburg
Norman	Catawba, Iredell, Lincoln, Mecklenburg
Rhodhiss	Burke, Caldwell
Santeetlah	Graham
Tillery	Montgomery, Stanly
Waccamaw	Columbus
Waterville	Haywood
Wylie	Gaston, Mecklenburg, NC; York, SC


81°00'
80°30'
80°00'
35°30'
35°00'
High Rock Lake
dam
N.C.
Map Location
Mooresville
China Grove
Landis
Kannapolis
Davidson
Cornelius
Coddle Cr.
Irish Buffalo Cr.
Huntersville
Westside
Concord
Concord
Mount Pleasant
Dutch Buffalo Cr.
Long Cr.
New London
Badin
Badin Lake
dam
Albemarle
Lake Tillery
Star
Troy
Biscoe
Candor
Mount Gilead
Little River
dam
Morrow Cr.
Rocky River
Reedy Cr.
Charlotte
Big Bear Cr.
Chest Cr.
Covington Cr.
Big Mountain Cr.
Little Mountain Cr.
Ellerbe
Ansonville
Crooked Cr.
Long Cr.
Polkton Cr.
Polkton
Monroe
Cedar Cr.
Seaforth Cr.
South Creek
BLEWETT FALLS LAKE
dam
outlet
Wadesboro
Lilesville
Rockingham
Hamlet
Pee Dee River
North Carolina
South Carolina
BLEWETT FALLS LAKE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
0 10 20 30 Km.
0 5 10 15 Mi.
Scale

BLEWETT FALLS LAKE

STORET NO. 3702

I. CONCLUSIONS

A. Trophic Condition:

Survey data show that Blewett Falls Lake is eutrophic. However, since the lake has a mean hydraulic retention time of only seven days, it more closely resembles a slow-moving river; and the term "over-enriched" may be a more appropriate description of the condition of this lake.

Blewett Falls Lake ranked thirteenth in overall trophic condition when the 16 North Carolina lakes sampled in 1973 were compared using a combination of six parameters*. Thirteen lakes had less and one had the same median total phosphorus, 14 had less median dissolved phosphorus, 13 had less median inorganic nitrogen, but only four lakes had less mean chlorophyll a. The relatively low concentrations of chlorophyll a and the high nutrient levels indicate primary productivity may have been light-limited. Fourteen of the lakes had greater mean Secchi disc transparency, and Survey limnologists noted that the lake was quite turbid at all sampling times. However, it is likely that primary productivity would not be very high in any case because of the very short hydraulic retention time of the lake.

* See Appendix A.

Depression of dissolved oxygen with depth occurred at sampling station 3 in July, and dissolved oxygen in the shallowest samples collected in September did not exceed 77% of saturation.

Survey limnologists did not observe rooted aquatic vegetation or concentrations of algae during their visits to the lake.

B. Rate-Limiting Nutrient:

Because of a loss of nutrients in the assay sample from the time of collection to the beginning of the assay, the results are not representative of conditions in the lake at the time the sample was taken (03/23/73).

The lake data indicate phosphorus limitation at all three stations in March and July and at station 1 in September also. However, nitrogen limitation is indicated at stations 2 and 3 in September.

C. Nutrient Controllability:

1. Point sources--The phosphorus contributions of the listed point sources amounted to only 2.3% of the total load to Blewett Falls Lake. However, there are at least eight municipal wastewater treatment plants in the Rocky River drainage beyond the 40-kilometer limit of the Survey* (Anonymous,

* See Working Paper No. 175, "...Survey Methods, 1973-1976".

1971). These plants serve a combined 1970 population of 47,281 people.

Also there are major point sources in the Yadkin River drainage upstream from Lake Tillery (Anonymous, 1973); and during the sampling year, some 264,000 kg of total phosphorus were exported from Lake Tillery to Blewett Falls Lake (see Working Paper No. 390, "Report on Lake Tillery"). However, the total phosphorus load measured in the Pee Dee River at the inlet to Blewett Falls Lake, below the confluence of the Rocky River, amounted to more than 900,000 kg during the sampling year. If most of the difference is attributable to the Rocky River phosphorus load, it appears that drainage contributed on the order of 600,000 kg of total phosphorus during the year. Considering the estimated 4,000 km^2 drainage area of the Rocky River, this phosphorus load seems quite high (150 kg/km^2), and a need for a more-detailed study of this drainage and point sources is indicated.

The present Blewett Falls Lake phosphorus loading rate of 91 $g/m^2/yr$ is 18 times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic rate (see page 16). However, the mean hydraulic retention time of the lake is a very short seven days, and it is probable that Vollenweider's model is not applicable to this water body.

As noted in the discussion of trophic condition, the primary productivity of Blewett Falls Lake may have been light-limited because of turbidity. If the turbidity observed during Survey sampling is a persistent characteristic of this lake, point-source phosphorus control would not be expected to result in a significant improvement in the trophic condition. However, if the turbidity is not a typical condition, every effort should be made to minimize the phosphorus inputs to the lake.

2. Non-point sources--The phosphorus export rate of the Pee Dee River was nearly six times the mean of the rates of the other Blewett Falls Lake tributaries (see page 16). This high rate probably was due in large part to point-source inputs in the Rocky River and Yadkin River drainages as noted above.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 10.36 kilometers^2.
2. Mean depth: 11.6 meters.
3. Maximum depth: 11.9 meters.
4. Volume: 120 x 10^6 m^3.
5. Mean hydraulic retention time: 7 days.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Pee Dee River	16,397.3	198.0
Cedar Creek	40.4	0.3
Savannah Creek	37.0	0.3
Smith Creek	26.2	0.2
Mountain Creek	194.2	2.6
Little River	911.7	9.6
Dry Creek	20.7	0.2
Cartledge Creek	78.5	1.2
Minor tributaries & immediate drainage -	76.9	1.2
Totals	17,782.9	213.6

2. Outlet -

Pee Dee River	17,793.3**	213.6**

† Table of metric conversions--Appendix B.
†† Park, 1974.
* For limits of accuracy, see Working Paper No. 175.
** Includes area of lake; outflow adjusted to equal sum of inflows.

C. Precipitation*:

1. Year of sampling: 140.6 centimeters.

2. Mean annual: 121.8 centimeters.

* See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Blewett Falls Lake was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from three stations on the lake and from one or more depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the three stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 1.2 meters at station 1, 6.4 meters at station 2, and 9.1 meters at station 3.

The lake sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR HEWETT FALLS LAKE
STORET CODE 3702

PARAMETER	1ST SAMPLING (3/23/73) 3 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (7/ 5/73) 3 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (9/19/73) 3 SITES RANGE	MEAN	MEDIAN
TEMP (C)	11.5 - 12.5	12.0	12.0	25.5 - 28.5	26.4	26.0	26.0 - 26.3	26.2	26.2
DISS OXY (MG/L)	9.6 - 10.2	10.0	10.0	4.2 - 7.9	5.3	4.9	5.2 - 6.2	6.0	6.1
CNDCTVY (MCHOMO)	80. - 90.	84.	83.	60. - 90.	78.	80.	62. - 158.	107.	94.
PH (STAND UNITS)	7.1 - 7.4	7.3	7.2	6.8 - 8.9	7.3	6.9	6.5 - 7.1	6.7	6.7
TOT ALK (MG/L)	16. - 19.	18.	18.	17. - 27.	22.	23.	24. - 36.	30.	28.
TOT P (MG/L)	0.087 - 0.109	0.100	0.100	0.043 - 0.092	0.065	0.064	0.020 - 0.184	0.078	0.058
ORTHO P (MG/L)	0.032 - 0.045	0.042	0.040	0.006 - 0.028	0.013	0.012	0.015 - 0.150	0.058	0.035
NO2+NO3 (MG/L)	0.500 - 0.576	0.543	0.540	0.240 - 0.640	0.462	0.450	0.230 - 0.380	0.284	0.270
AMMONIA (MG/L)	0.150 - 0.190	0.163	0.166	0.080 - 0.140	0.124	0.130	0.040 - 0.080	0.064	0.060
KJEL N (MG/L)	0.400 - 1.190	0.645	0.500	0.300 - 0.400	0.489	0.400	0.200 - 0.400	0.262	0.200
INORG N (MG/L)	0.650 - 0.740	0.703	0.700	0.430 - 0.770	0.587	0.570	0.270 - 0.460	0.347	0.340
TOTAL N (MG/L)	0.930 - 1.840	1.188	1.173	0.760 - 1.190	0.951	0.930	0.430 - 0.780	0.540	0.470
CHLRPYL A (UG/L)	2.3 - 2.8	2.5	2.5	2.2 - 8.9	4.0	2.9	2.1 - 8.9	6.0	7.1
SECCHI (METERS)	0.3 - 0.9	0.4	0.4	0.3 - 0.5	0.4	0.5	0.9 - 1.5	1.1	1.0

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal units per ml
03/23/73	1. Synedra	30
	2. Oscillatoria	29
	3. Cryptomonas	22
	4. Tabellaria	7
	5. Scenedesmus	7
	Other genera	15
	Total	110
07/05/73	1. Melosira	202
	2. Nitzschia	130
	3. Cryptomonas	72
	4. Oscillatoria	58
	5. Stephanodiscus	58
	Other genera	171
	Total	691
09/19/73	1. Raphidiopsis	1,173
	2. Flagellates	156
	3. Melosira	118
	4. Nitzschia	98
	5. Synedra	59
	Other genera	155
	Total	1,759

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
03/23/73	01	2.5
	02	2.3
	03	2.6
07/05/73	01	2.2
	02	2.9
	03	6.9
09/19/73	01	2.1
	02	7.1
	03	8.9

C. Limiting Nutrient Study:

A 30% loss of orthophosphorus and 61% loss of inorganic nitrogen occurred in the assay sample between the time of collection and the beginning of the assay, and the assay results are not representative of conditions in the lake at the time the sample was taken (03/23/73).

The lake data indicate phosphorus limitation at all three sampling stations in March and July and at station 1 in September also (the mean inorganic nitrogen/orthophosphorus ratios were 18/1 or greater). However, the data indicate nitrogen limitation at stations 2 and 3 in September (the mean N/P ratios were 4/1 and 9/1, respectively).

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the North Carolina National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of January and February when two samples were collected. Sampling was begun in March, 1973, and was completed in March, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the North Carolina District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

Except for Smith Creek, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any. However, the estimated phosphorus load from Lilesville exceeded the load measured in Smith Creek at station D-1, and the non-point nutrient contributions of this stream were estimated.

Nutrient loads for Smith Creek and unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient exports, in $kg/km^2/year$, at stations B-1, C-1, G-1, and H-1 and multiplying the means by the Smith Creek and ZZ areas in km^2.

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* See Working Paper No. 175.

The operators of the Biscoe and Wadesboro wastewater treatment plants provided monthly effluent samples and corresponding flow data (the Wadesboro plant does not impact Blewett Falls Lake; however, the analytical data are included in Appendix E for the record). The operators of the Norwood, Mount Gilead, Ellerbe, Lilesville, Troy, and Albemarle wastewater treatment plants did not participate in the Survey, and nutrient loads were estimated at 1.134 kg P and 3.401 kg N/capita/year.

Other wastewater treatment plants are located within the direct drainage basin of the lake (see map, page v). Nutrient loads from these plants were not determined since they are well beyond the 40-kilometer limit of the Survey. Also, major point sources are located in the Yadkin River drainage upstream from Lake Tillery which also impact Blewett Falls Lake. The nutrient contributions of all of these sources are included in the Pee Dee River loads measured at station A-2, however.

A. Waste Sources:

1. Known municipal -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Norwood	1,896*	Imhoff tank	605.6**	Rocky River
Biscoe	1,200†	act. sludge	567.8	Little River
Mt. Gilead	1,286*	stab. pond	378.5**	Clarks Creek/ Pee Dee River
Ellerbe	913*	stab. pond	345.6††	Little Mountain Creek
Lilesville	641**	Imhoff tank	242.6††	Smith Creek
Troy	2,429*	stab. pond	794.9**	Denson Creek/ Little River
Albermarle	11,126*	trickling filter	26,495.0**	Long Creek

2. Known industrial - None

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* 1970 Census.
** Anonymous, 1971.
† STP questionnaire.
†† Estimate based on 0.3785 m^3/capita/day.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Pee Dee River	907,845	96.2
Cedar Creek	270	<0.1
Savannah Creek	290	<0.1
Smith Creek	230	<0.1
Mountain Creek	2,410	0.3
Little River	8,705	0.9
Dry Creek	255	<0.1
Cartledge Creek	655	0.1
b. Minor tributaries & immediate drainage (non-point load) -	675	0.1
c. Known municipal STP's -		
Norwood	2,150	0.2
Biscoe	1,280	0.1
Mount Gilead	1,460	0.2
Ellerbe	1,035	0.1
Lilesville	725	0.1
Troy	2,755	0.3
Albemarle	12,615	1.4
d. Septic tanks - Unknown	-	-
e. Known industrial - None	-	-
f. Direct precipitation* -	180	<0.1
Total	943,535	100.0

2. Outputs -

Lake outlet - Pee Dee River 517,685

3. Net annual P accumulation - 425,850 kg.

* See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (non-point load) -		
Pee Dee River	7,711,655	93.1
Cedar Creek	6,280	0.1
Savannah Creek	7,305	0.1
Smith Creek	6,055	0.1
Mountain Creek	95,875	1.2
Little River	333,285	4.0
Dry Creek	4,965	0.1
Cartledge Creek	26,025	0.3
b. Minor tributaries & immediate drainage (non-point load) -	17,770	0.2
c. Known municipal STP's -		
Norwood	6,450	0.1
Biscoe	1,275	<0.1
Mount Gilead	4,375	<0.1
Ellerbe	3,105	<0.1
Lilesville	2,180	<0.1
Troy	8,260	0.1
Albemarle	37,840	0.5
d. Septic tanks - Unknown	-	-
e. Known industrial - None	-	-
f. Direct precipitation* -	11,185	0.1
Total	8,283,885	100.0

2. Outputs -

Lake outlet - Pee Dee River 7,005,540

3. Net annual N accumulation - 1,278,345 kg.

* See Working Paper No. 175.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Pee Dee River	55	470
Cedar Creek	7	155
Savannah Creek	8	197
Smith Creek	9	231
Mountain Creek	12	494
Little River	10	366
Dry Creek	12	240
Cartledge Creek	8	332

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" rate is the rate at which the receiving water would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m²/yr	91.07	41.11	799.6	123.4

Vollenweider loading rates for phosphorus (g/m²/yr) based on mean depth and mean hydraulic retention time of Blewett Falls Lake:

"Dangerous" (eutrophic rate)	5.00
"Permissible" (oligotrophic rate)	2.50

V. LITERATURE REVIEWED

Anonymous, 1971. Inventory of municipal waste facilities. EPA Publ. OWP-1, vol. 4, Washington, DC.

Park, David, 1974. Personal communication (lake morphometry). NC Dept. of Nat. & Econ. Resources, Raleigh.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

Weiss, Charles M., 1972. A proposal to the Water Resources Research Institute of the University of North Carolina. The trophic state of North Carolina lakes, covering the period July 1, 1972 to June 30, 1973. U. of North Carolina, Chapel Hill.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	3719	LAKE WACCAMAW	534
2	3716	SANTEELAH LAKE	446
3	3711	MOUNTAIN ISLAND LAKE	419
4	3707	HIWASSEE LAKE	414
5	3704	FONTANA LAKE	392
6	3713	LAKE NORMAN	346
7	3708	LAKE JAMES	334
8	3710	LOOKOUT SHOALS	327
9	3715	RHODHISS LAKE	296
10	3705	LAKE HICKORY	283
11	3717	LAKE TILLERY	246
12	3709	LAKE JUNALUSKA	220
13	3702	BLEWETT FALLS LAKE	200
14	3718	WATERVILLE RESERVOIR	140
15	3701	BADIN LAKE	124
16	3706	HIGH ROCK LAKE	76

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
3701	BADIN LAKE	33 (5)	7 (1)	27 (4)	27 (4)	3 (0)	27 (4)	124
3702	BLEWETT FALLS LAKE	7 (1)	13 (2)	7 (1)	73 (11)	93 (14)	7 (1)	200
3704	FONTANA LAKE	100 (15)	33 (5)	93 (14)	100 (15)	3 (0)	63 (9)	392
3705	LAKE HICKORY	27 (4)	60 (9)	53 (8)	13 (2)	80 (12)	50 (7)	283
3706	HIGH ROCK LAKE	13 (2)	20 (3)	0 (0)	0 (0)	23 (2)	20 (3)	76
3707	HIWASSEE LAKE	87 (13)	80 (12)	87 (13)	47 (7)	50 (7)	63 (9)	414
3708	LAKE JAMES	60 (9)	87 (13)	80 (12)	7 (1)	23 (2)	77 (11)	334
3709	LAKE JUNALUSKA	47 (7)	27 (4)	43 (6)	20 (3)	50 (7)	33 (5)	220
3710	LOOKOUT SHOALS	53 (8)	47 (7)	60 (9)	67 (10)	60 (9)	40 (6)	327
3711	MOUNTAIN ISLAND LAKE	73 (11)	73 (11)	43 (6)	53 (8)	87 (13)	90 (13)	419
3713	LAKE NORMAN	67 (10)	53 (8)	73 (11)	40 (6)	23 (2)	90 (13)	346
3715	RHODHISS LAKE	20 (3)	67 (10)	33 (5)	93 (14)	70 (10)	13 (2)	296
3716	SANTEELAH LAKE	93 (14)	93 (14)	100 (15)	60 (9)	23 (2)	77 (11)	446
3717	LAKE TILLERY	40 (6)	40 (6)	13 (2)	33 (5)	70 (10)	50 (7)	246
3718	WATERVILLE RESERVOIR	0 (0)	0 (0)	20 (3)	80 (12)	40 (6)	0 (0)	140
3719	LAKE WACCAMAW	80 (12)	100 (15)	67 (10)	87 (13)	100 (15)	100 (15)	534

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
3701	BADIN LAKE	0.042	0.680	466.750	7.190	14.900	0.012
3702	BLEWETT FALLS LAKE	0.090	0.655	476.889	4.167	10.800	0.034
3704	FONTANA LAKE	0.011	0.550	392.650	3.438	14.900	0.007
3705	LAKE HICKORY	0.047	0.320	461.000	7.275	13.400	0.008
3706	HIGH ROCK LAKE	0.090	0.580	477.454	14.283	14.800	0.017
3707	HIWASSEE LAKE	0.015	0.240	420.555	5.678	14.200	0.007
3708	LAKE JAMES	0.020	0.160	428.866	7.660	14.800	0.006
3709	LAKE JUNALUSKA	0.031	0.560	462.000	7.233	14.200	0.009
3710	LOOKOUT SHOALS	0.026	0.370	459.167	4.200	13.800	0.008
3711	MOUNTAIN ISLAND LAKE	0.018	0.270	462.000	5.580	12.800	0.005
3713	LAKE NORMAN	0.019	0.330	446.667	5.807	14.800	0.005
3715	RHODHISS LAKE	0.061	0.305	462.111	3.578	13.600	0.019
3716	SANTEELAH LAKE	0.011	0.160	366.400	5.360	14.800	0.006
3717	LAKE TILLERY	0.040	0.470	468.600	6.827	13.600	0.008
3718	WATERVILLE RESERVOIR	0.103	0.860	468.333	3.817	14.400	0.041
3719	LAKE WACCAMAW	0.018	0.120	455.667	3.583	9.800	0.004

APPENDIX B

CONVERSIONS FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA 10/21/75

LAKE CODE 3702 BLEWETT FALLS RESERVOIR

TOTAL DRAINAGE AREA OF LAKE(SQ MI) 6870.00

TRIBUTARY	SUB-DRAINAGE AREA(SQ MI)	NORMALIZED FLOWS(CFS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
3702A1	6870.00	10140.0	12030.0	12510.0	10550.0	6598.0	5353.0	5341.0	5660.0	5938.0	5795.0	5268.0	7080.0	7662.9
3702A2	6331.00	9400.0	10930.0	11320.0	9600.0	6210.0	5040.0	5020.0	5400.0	5120.0	5040.0	4840.0	6280.0	6994.0
3702B1	15.60	19.00	28.00	27.00	18.00	8.00	5.50	6.50	6.00	5.80	5.00	6.50	11.00	12.10
3702C1	14.30	17.00	24.00	24.00	16.00	6.00	4.80	5.50	5.30	5.00	4.00	4.50	7.00	10.17
3702D1	10.10	14.00	20.00	19.00	12.00	5.50	4.00	4.50	4.30	4.00	3.50	6.00	9.00	8.75
3702E1	75.00	113.00	155.00	150.00	135.00	75.00	57.00	63.00	57.00	55.00	70.00	75.00	90.00	90.84
3702F1	352.00	450.00	650.00	650.00	610.00	240.00	200.00	190.00	145.00	135.00	250.00	230.00	320.00	337.11
3702G1	8.00	7.90	13.00	12.00	11.00	4.30	3.50	3.30	2.60	2.40	4.50	5.00	5.60	6.21
3702H1	30.30	55.00	125.00	95.00	88.00	22.00	16.00	15.00	10.00	9.00	23.00	16.00	33.00	41.68
3702Z2	33.70	60.00	81.00	78.00	62.00	30.00	25.00	29.00	26.00	25.00	27.00	28.00	38.00	42.18

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 6870.00
SUM OF SUB-DRAINAGE AREAS = 6869.99

TOTAL FLOW IN = 90830.87
TOTAL FLOW OUT = 92263.00

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3702A1	3	73	17800.00	25	12500.00				
	4	73	23700.00	29	20400.00				
	5	73	10400.00						
	6	73	9860.00	3	10700.00				
	7	73	7320.00	8	1170.00				
	8	73	6960.00	9	9180.00				
	9	73	3630.00	9	1580.00				
	10	73	3990.00	14	602.00				
	11	73	4540.00	4	2890.00				
	12	73	8100.00	2	445.00				
	1	74	16500.00	6	12500.00	18	10100.00		
	2	74	17400.00	3	26100.00	14	13600.00		
	3	74	9400.00	3	11000.00				
3702A2	3	73	16300.00	25	10600.00				
	4	73	21500.00	29	18600.00				
	5	73	9770.00						
	6	73	9140.00	3	7310.00				
	7	73	6910.00	8	550.00				
	8	73	6700.00	5	8620.00				
	9	73	3520.00	9	150.00				
	10	73	3850.00	14	160.00				
	11	73	4300.00	4	1730.00				
	12	73	7600.00	2	280.00				
	1	74	15500.00	6	7620.00	18	8560.00		
	2	74	16000.00	3	26400.00	14	9320.00		
	3	74	8500.00	3	11700.00				

TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA 10/21/75

LAKE CODE 3702 BLEWETT FALLS RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3702B1	3	73	39.00	25	18.00				
	4	73	55.00	29	23.00				
	5	73	8.10						
	6	73	13.00	3	3.50				
	7	73	17.00	8	4.00				
	8	73	4.00	5	8.00				
	9	73	1.70	9	1.10				
	10	73	1.30	14	0.90				
	11	73	1.20	4	1.10				
	12	73	9.50	2	1.50				
	1	74	30.00	6	14.00	18	5.60		
	2	74	40.00	3	140.00	14	14.00		
	3	74	12.00	3	9.20				
3702C1	3	73	35.00	25	15.00				
	4	73	50.00	29	37.00				
	5	73	12.00						
	6	73	16.00	3	1.50				
	7	73	3.70	8	1.70				
	8	73	1.60	5	2.40				
	9	73	1.60	9	0.30				
	10	73	1.20	14	0.10				
	11	73	1.50	4	0.20				
	12	73	8.70	2	0.10				
	1	74	27.00	6	16.00	18	4.30		
	2	74	36.00	3	175.00	14	13.00		
	3	74	11.00	3	6.40				
3702D1	3	73	25.00	25	11.00				
	4	73	35.00	29	25.00				
	5	73	5.20						
	6	73	8.10	3	0.80				
	7	73	11.00	8	1.20				
	8	73	2.60	5	1.70				
	9	73	1.10	9	0.20				
	10	73	0.90	14	0.10				
	11	73	1.10	4	0.10				
	12	73	6.20	2	0.10				
	1	74	19.00	6	11.00	18	3.00		
	2	74	26.00	3	125.00	14	9.40		
	3	74	8.00	3	4.50				
3702E1	3	73	190.00	25	100.00				
	4	73	270.00	29	105.00				
	5	73	72.00						
	6	73	75.00	3	40.00				
	7	73	49.00	8	40.00				
	8	73	36.00	5	65.00				
	9	73	15.00	9	9.20				
	10	73	5.80	14	5.90				
	11	73	9.80	4	7.80				
	12	73	41.00	2	14.00				
	1	74	125.00	6	58.00	18	34.00		
	2	74	145.00	3	450.00	14	68.00		
	3	74	80.00	3	59.00				

TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA 10/21/75

LAKE CODE 3702 BLEWETT FALLS RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3702F1	3	73	900.00	25	470.00				
	4	73	1400.00	29	490.00				
	5	73	340.00						
	6	73	350.00	3	190.00				
	7	73	230.00	8	185.00				
	8	73	170.00	5	310.00				
	9	73	70.00	9	43.00				
	10	73	27.00	14	26.00				
	11	73	45.00	4	37.00				
	12	73	195.00	2	63.00				
	1	74	575.00	6	270.00	18	160.00		
	3	74	380.00	3	280.00				
3702G1	3	73	21.00	25	11.00				
	4	73	27.00	29	11.00				
	5	73	7.50						
	6	73	8.00	3	4.50				
	7	73	5.00	8	4.30				
	8	73	3.80	5	7.20				
	9	73	1.50	9	1.00				
	10	73	0.60	14	0.60				
	11	73	1.00	4	0.80				
	12	73	4.40	2	1.40				
	1	74	13.00	6	6.20	18	3.60		
	2	74	16.00	3	48.00	14	7.20		
	3	74	8.50	3	6.40				
3702H1	3	73	80.00	25	60.00				
	4	73	120.00	29	63.00				
	5	73	36.00						
	6	73	37.00	3	15.00				
	7	73	20.00	8	15.00				
	8	73	13.00	5	32.00				
	9	73	3.50	9	1.60				
	10	73	0.80	14	0.80				
	11	73	1.70	4	1.30				
	12	73	15.00	2	3.00				
	1	74	80.00	6	26.00	18	12.00		
	2	74	105.00	3	180.00	14	33.00		
	3	74	44.00	3	26.00				
3702Z2	3	73	83.00						
	4	73	130.00						
	5	73	18.00						
	6	73	27.00						
	7	73	37.00						
	8	73	8.80						
	9	73	3.70						
	10	73	2.60						
	11	73	2.60						
	12	73	20.00						
	1	74	65.00						
	2	74	85.00						
	3	74	27.00						

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/10/20

370201
35 04 30.0 079 53 46.0
BLEWETT FALLS LAKE
37153 NORTH CAROLINA

11EPALES
3

2111202
0007 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/23	09 45	0000	11.8		10	81	7.20	16	0.190	1.100	0.540	0.044
	09 45	0004	11.8	10.2		83	7.10	18	0.150	0.400	0.530	0.032
73/07/05	16 00	0000	25.7		10	80	6.90	17	0.120	0.600	0.450	0.012
	16 00	0004	25.7	5.4		80	6.90	18	0.120	0.400	0.450	0.012
73/09/19	16 05	0000	26.2	6.2	60L	62	7.10	24	0.060	0.200	0.280	0.015

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/23	09 45	0000	0.103	2.5
	09 45	0004	0.087	
73/07/05	16 00	0000	0.080	2.2
	16 00	0004	0.045	
73/09/19	16 05	0000	0.020	2.1

L ACTUAL VALUE IS KNOWN TO BE
GREATER THAN VALUE GIVEN

STORET RETRIEVAL DATE 75/10/20

370202
35 00 17.0 079 53 37.0
BLEWETT FALLS LAKE
37153 NORTH CAROLINA

11EPALES
3

2111202
0025 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/23	10 25	0000	12.2		10	80	7.20	16	0.180	0.800	0.500	0.041
	10 25	0006	11.7	10.0		83	7.20	18	0.160	0.500	0.560	0.040
	10 25	0013	11.5	10.0		90	7.20	18	0.160	0.600	0.570	0.042
	10 25	0021	11.5	10.0		88	7.20	19	0.170	0.600	0.570	0.045
73/07/05	15 15	0000	26.7		18	82	8.10	23	0.120	0.700	0.390	0.009
	15 15	0006	26.2	4.9		90	7.00	25	0.130	0.300	0.640	0.028
	15 15	0014	26.0	5.0		80	6.90	27	0.140	0.300	0.540	0.018
73/09/19	16 20	0000	26.3		34	158	7.00	36	0.080	0.400	0.380	0.150
	16 20	0005	26.3	6.0		140	6.80	36	0.060	0.400	0.330	0.102
	16 20	0013	26.1	6.0		149	6.70	35	0.060	0.300	0.310	0.075

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/23	10 25	0000	0.044	2.3
	10 25	0006	0.163	
	10 25	0013	0.139	
	10 25	0021	0.104	
73/07/05	15 15	0000	0.009	2.9
	15 15	0006	0.042	
	15 15	0014	0.074	
73/09/19	16 20	0000	0.184	7.1
	16 20	0005	0.127	
	16 20	0013	0.044	

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STORET RETRIEVAL DATE 75/10/20

370203
34 59 07.0 079 52 21.0
BLEWETT FALLS LAKE
37007 NORTH CAROLINA

11EPALES
3

2111202
0028 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/23	13 00	0000	12.5		10	80	7.40	18	0.170	0.700	0.530	0.038
	13 00	0006	12.4	10.0		80	7.40	17	0.150	0.600	0.530	0.036
	13 00	0012	12.2	10.0		80	7.30	17	0.150	0.700	0.530	0.038
	13 00	0018	12.0	9.8		85	7.30	18	0.150	0.500	0.550	0.039
	13 00	0024	12.0	9.8		90	7.30	19	0.160	0.600	0.560	0.040
73/07/05	14 30	0000	28.5		18	80	8.90	24	0.140	0.900	0.290	0.008
	14 30	0006	27.4	7.9		80	7.50	23	0.080	0.400	0.360	0.006
	14 30	0015	25.9	4.3		75	6.90	23	0.130	0.400	0.530	0.015
	14 30	0030	25.5	4.2		73	6.80	21	0.140	0.400	0.510	0.013
73/09/19	16 40	0000	26.3		38	77	6.60	26	0.070	0.200	0.240	0.017
	16 40	0005	26.2	5.2		85	6.60	26	0.040	0.200K	0.230	0.031
	16 40	0015	26.1	5.2		89	6.50	26	0.060	0.200	0.240	0.031
	16 40	0025	26.0	5.2		98	6.70	29	0.080	0.200	0.260	0.040

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/23	13 00	0000	0.095	2.6
	13 00	0006	0.090	
	13 00	0012	0.100	
	13 00	0018	0.100	
	13 00	0024	0.102	
73/07/05	14 30	0000	0.089	5.9
	14 30	0006	0.043	
	14 30	0015	0.048	
	14 30	0030	0.052	
73/09/19	16 40	0000	0.042	4.9
	16 40	0005	0.040	
	16 40	0015	0.046	
	16 40	0025	0.070	

K VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/10/20

3702A1 LS3702A1
34 57 00.0 079 52 30.0
PEE DEE RIVER
37167 7.5 ROCKINGHAM
U/BLEWETT FALLS RESVR
US HWY 74 BRDG 6.6 MI ESE OF LILESVILLE
11EPALES 2111204
0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 -TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	12 00		0.460	0.360	0.091	0.029	0.075
73/04/24	09 35		0.399	0.460	0.072	0.042	0.085
73/06/03	08 30		0.390	0.310	0.042	0.019	0.070
73/07/08	08 20		0.460	0.540	0.086	0.025	0.055
73/08/05	08 15		0.270	0.420	0.060	0.007	0.065
73/09/09	08 40		0.180	0.900	0.077	0.019	0.040
73/10/14	08 45		0.357	3.100	0.180	0.029	0.100
73/11/04	08 20		0.290	0.725	0.083	0.046	0.070
73/12/02	08 40		0.310	0.830	0.036	0.032	0.060
74/01/06	08 40		0.580	0.790	0.192	0.032	0.085
74/01/18	10 15		0.672	0.600	0.092	0.032	0.050
74/02/03	08 35		0.560	0.500	0.052	0.036	0.090
74/02/14	11 30		0.570	0.600	0.060	0.035	0.120
74/03/03	08 25		0.528	0.500	0.045	0.040	0.085

STORET RETRIEVAL DATE 75/10/20

3702A2 LS3702A2
35 35 00.0 080 00 00.0
PEE DEE RIVER
37 7.5 MANGUM
I/BLEWETT FALLS RESVR
HWY 109 BRDG 2.75 MI SSW OFMANGUM
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	11	25	0.510	0.480	0.063	0.062	0.123
73/04/29	09	15	0.420	0.520	0.096	0.033	0.070
73/06/03	08	55	0.530	0.490	0.061	0.058	0.105
73/07/08	09	20	0.610	0.450	0.044	0.054	0.090
73/08/05	08	30	0.340	0.630	0.040	0.115	0.150
73/09/09	09	45	0.315	0.480	0.070	0.019	0.035
73/10/14	08	50	0.300	2.100	0.074	0.174	0.220
73/11/04	08	45	0.360	0.650	0.126	0.054	0.060
73/12/02	08	30	0.490	0.900	0.104	0.368	0.390
74/01/06	08	40	0.770	0.600	0.168	0.056	0.115
74/01/14	09	30	0.770	0.900	0.120	0.116	0.180
74/02/03	08	45	0.630	0.900	0.140	0.056	0.210
74/02/14	10	20	0.720	0.400	0.045	0.065	0.150
74/03/03	08	35	0.640	0.400	0.030	0.105	0.155

STORET RETRIEVAL DATE 75/10/20

3702B1 LS3702B1
35 04 30.0 079 59 30.0
CEDAR CREEK
37 7.5 MANGUM
T/HLEWETT FALLS RESVR
RD 1634 BRDG .9 MI E OF NC HWY 109
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	11	35	0.072	0.190	0.033	0.012	0.020
73/04/24	08	50	0.034	0.350	0.058	0.012	0.030
73/06/03	09	05	0.079	0.330	0.072	0.010	0.025
73/07/08	09	30	0.054	0.240	0.022	0.008	0.015
73/08/05	09	55	0.048	0.270	0.024	0.018	0.030
73/09/09	08	50	0.015	0.710	0.036	0.011	0.030
73/10/14	08	30	0.014	1.400	0.176	0.020	0.040
73/12/02	08	45	0.028	0.825	0.044	0.020	0.020
74/01/06	09	00	0.076	0.200	0.020	0.012	0.025
74/01/18	09	40	0.024	0.700	0.040	0.008	0.008
74/02/03	09	00	0.105	0.500	0.020	0.015	0.020
	09	25	0.084	0.500	0.028		
74/02/14	10	35	0.176	0.400	0.015	0.015	0.035

STORET RETRIEVAL DATE 73/10/20

3702C1 LS3702C1
35 04 30.0 079 55 30.0
SAVANNAH CHURCH
37 7.5 MANGUM
T/BLEWETT FALLS RESVR
RD 1704 BRDG .25 MI S SAVANNAH CHURCH
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	11 50		0.072	0.290	0.040	0.009	0.020
73/04/29	09 40		0.034	0.400	0.054	0.012	0.030
73/06/03	08 55		0.110	0.320	0.054	0.009	0.025
73/07/08	09 45		0.058	0.210	0.038	0.008	0.020
73/08/05	08 45		0.048	0.275	0.026	0.013	0.025
73/09/04	08 45		0.015	0.640	0.052	0.014	0.050
73/10/14	08 35		0.010K	1.850	0.056	0.017	0.055
73/11/04	08 30		0.015	1.800	0.063	0.026	0.060
73/12/02	08 40		0.024	1.700	0.084	0.012	0.040
74/01/06	08 45		0.044	0.500	0.032	0.012	0.025
74/01/15	09 50		0.012	1.400	0.068	0.008	0.015
74/02/03	08 30		0.064	0.100	0.015	0.010	0.015
	09 15		0.040	0.700	0.032		
74/02/14	10 45		0.112	0.460	0.020	0.010	0.035

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

370201 LS370201
34 54 30.0 079 55 30.0
SMITH CREEK
37 7.5 LILESVILLE
T/HLEWETT FALLS RESVR
RD 1744 BRDG 3.25 MI NE OF LILESVILLE
11EPALES 21112U4
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	12 10		0.058	0.190	0.019	0.012	0.020
73/04/24	08 20		0.075	0.280	0.054	0.013	0.025
73/06/03	08 35		0.082	0.380	0.034	0.006	0.025
73/07/08	10 00		0.044	0.230	0.029	0.008	0.020
73/08/05	08 20		0.010	0.350	0.019	0.011	0.040
73/09/09	08 30		0.018	0.330	0.058	0.013	0.030
73/10/14	08 20		0.040	0.450	0.074	0.013	0.020
73/11/04	08 15		0.038	0.850	0.052	0.014	0.020
73/12/02	08 50		0.044	0.900	0.068	0.005K	0.035
74/01/05	08 30		0.112	0.400	0.056	0.008	0.015
74/01/18	10 10		0.100	0.800	0.056	0.008	0.020
74/02/03	08 15		0.072	0.100K	0.010	0.010	0.015
	09 45		0.068	0.250	0.020	0.012	0.040
74/02/14	11 00		0.120	0.200	0.020	0.010	0.035

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

3702E1 L53702E1
35 03 30.0 079 52 30.0
MOUNTAIN CREEK
37 7.5 MANGUM
T/BLEWETT FALLS RESVR
RD 1148 BRDG 4.5 MI W OF LEN/TON
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	12	35	0.520	0.300	0.039	0.018	0.025
73/04/24	09	20	0.430	0.370	0.033	0.035	0.060
73/06/03	09	25	0.500	0.500	0.042	0.016	0.045
73/07/08	09	00	0.490	0.330	0.026	0.017	0.035
73/08/05	09	25	0.360	0.750	0.115	0.021	0.050
73/09/04	09	25	0.240	0.720	0.058	0.013	0.055
73/10/14	09	25	0.420	2.300	0.350	0.017	0.040
73/11/04	09	00	0.270	1.450	0.095	0.042	0.075
73/12/02	09	10	0.450	0.900	0.068	0.028	0.038
74/01/05	09	30	0.740	0.500	0.064	0.020	0.030
74/01/18	10	45	0.820	0.800	0.056	0.020	0.040
74/02/03	09	25	0.410	0.700	0.044	0.024	
74/02/14	10	43	0.704	0.300	0.020	0.015	0.040
74/03/03	09	00	0.700	0.200	0.040	0.010	0.020

STORET RETRIEVAL DATE 75/10/20

3702F1 LS3702F1
35 06 30.0 079 54 00.0
LITTLE RIVER
37 7.5 MANGUM
T/BLEWETT FALLS RESVR
RD 1148 BRDG 3.5 MI SW OF COVINGTON
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	12 50		0.120	0.340	0.036	0.016	0.025
73/04/29	08 30		0.140	0.650	0.072	0.027	0.060
73/06/03	09 30		0.230	0.300	0.040	0.019	0.045
73/07/08	09 15		0.410	1.890	0.096	0.038	0.065
73/08/05	10 15		0.190	0.480	0.072	0.029	0.055
73/09/04	09 20		0.063	0.950	0.061	0.015	0.037
73/10/14	09 40		0.022	4.100	0.176	0.015	0.025
73/11/04	09 15		0.014	1.550	0.058	0.014	0.020
73/12/02	09 25		0.028	0.700	0.028	0.005K	0.015
74/01/06	09 50		0.264	0.700	0.068	0.028	0.070
74/01/14	11 00		0.250	0.400	0.044	0.032	0.055
74/02/03	09 35		0.120	0.700	0.036	0.024	
74/02/14	10 30		0.208	0.300	0.020	0.020	0.045
74/03/03	09 10		0.148	0.500	0.045	0.015	0.035

K VALUE KNOWN TO BE
LESS THAN INDICATED

QUERY RETRIEVAL DATE 79/10/26

370261 LS370261
35 06 30.0 080 00 00.0
DRY CREEK
37 7.5 MANGUM
T/BLEWETT FALLS RESVR
HWY 109 BRDG .4 S INTERSEC WITH RD 1145
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00631 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/05/25	11	00	0.140	0.400	0.028	0.013	0.027
73/06/29	09	00	0.150	0.730	0.115	0.016	0.040
73/08/03	09	15	0.241	0.580	0.056	0.022	0.070
73/09/08	09	35	0.330	0.580	0.048	0.029	0.065
73/08/05	08	55	0.210	0.460	0.029	0.024	0.045
73/09/04	09	10	0.013	0.905	0.033	0.015	0.050
73/10/14	09	10	0.014	3.150	0.694	0.012	0.065
73/11/04	09	05	0.010K	1.500	0.034	0.013	0.040
73/12/02	09	50	0.012	1.700	0.025	0.005K	0.040
74/01/05	09	50	0.320	0.710	0.048	0.012	0.030
74/01/14	09	20	0.270	0.700	0.036	0.008	0.025
74/02/04	09	35	0.030	0.400	0.052	0.032	0.045
74/02/14	10	10	0.400	0.400	0.015	0.010	0.032
74/03/04	09	30	0.180	0.400	0.040	0.010	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED

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STORET RETRIEVAL DATE 73/10/20

3702H1 LS3702H1
34 58 30.0 079 51 30.0
CARTLEDGE CREEK
37 7.5 ROCKINGHAM
T/HLEWETT FALLS RESVR
RD 1141 HROG 3.5 SSW OF HOLLY GROVE
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/29	12 20		0.147	0.200	0.016	0.014	0.015
73/04/24	09 30		0.100	0.330	0.024	0.007	0.020
73/05/03	09 30		0.092	0.280	0.032	0.006	0.020
73/07/06	08 45		0.100	0.710	0.032	0.011	0.020
73/08/05	08 45		0.030	0.550	0.061	0.011	0.025
73/09/04	09 30		0.028	0.870	0.046	0.011	0.025
73/10/16	09 35		0.011	1.250	0.085	0.009	0.015
73/11/04	08 45		0.010K	0.500	0.066	0.015	0.015
73/12/06	09 00		0.032	0.500	0.040	0.005K	0.115
74/01/05	09 15		0.130	1.300	0.072	0.005K	0.015
74/02/14	10 30		0.100	0.200	0.024	0.005K	0.015
74/03/04	09 00		0.084	0.500	0.032	0.008	
74/04/16	11 00		0.232	0.420	0.040	0.005	0.020
74/05/14	09 40		0.204	0.410	0.025	0.005K	0.005

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

3702FA AS3702FA P001200*
35 22 00.0 079 47 30.0
BISCOE NC
37167 MONTGOMERY CO HW
T/BLEWETT FALLS LAKE
LITTLE RIVER
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/05/02	13 30		0.520	4.500	0.910	3.750	4.000	0.179	0.183
73/06/01	13 30		0.020	3.100	0.120	3.050	3.500	0.125	0.136
73/07/05	14 00		0.090	4.600	0.050	3.540	4.400	0.133	0.172
73/08/01	15 00		0.230	4.200	0.230	4.420	9.800	0.121	0.119
73/09/04	11 30		0.026	3.050	0.610	3.520		0.101	0.103
73/10/04	11 00		0.180	4.700	0.066	7.100	7.700	0.118	0.113
73/11/01	15 00		0.720	5.950	0.094	5.400	6.200	0.097	0.095
73/12/10	08 00		2.600	6.100	0.052	7.700	8.700	0.122	0.099
74/01/04	11 00		4.300	2.700	0.140	6.700	7.000	0.137	0.172
74/02/04	09 00		1.400	4.100	0.062	4.700	5.200	0.214	0.204
74/03/04	10 30		1.200	3.000	0.072	3.300	3.400	0.122	0.267
74/04/02	13 00		0.520	4.000	0.110	3.000	3.700	0.124	0.144
74/06/07	11 00		12.000	6.550	1.250	10.000	10.500	0.124	0.140

42.

STORET RETRIEVAL DATE 75/10/20

3702JA TF3702JA P004000*
34 57 30.0 080 04 00.0
WADESBORO NC
37 ANSON CO HWY MAP
T/BLEWETT FALLS RES
BRUSHY FORK CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/05/04	07	00							
CP(T)-			0.033	16.000	0.920	3.350	7.200	2.400	2.300
73/05/04	15	00							
73/06/04	07	00	0.035	21.000	2.450	4.500	11.500	2.480	
73/07/05	07	00							
CP(T)-			0.050	28.000	14.000	6.370	9.750	0.280	1.940
73/07/05	15	00							
73/08/03	07	00							
CP(T)-			0.140	16.000	1.150	2.800	9.500	2.250	1.750
73/08/03	15	00							
73/09/04	07	00							
CP(T)-			0.048	25.200			12.000	2.350	0.126
73/09/04	15	00							
73/10/02	07	00							
CP(T)-			0.160	10.000	0.140	3.500	7.200	2.500	1.750
73/10/02	15	00							
73/11/02	07	00							
CP(T)-			0.260	11.000	0.200	2.000	4.100	2.350	1.750
73/11/02	15	00							
73/12/03	07	00							
CP(T)-			0.180	16.500	0.230	2.310	6.000	2.000	1.500
73/12/03	15	00							
74/01/03	07	00							
CP(T)-			0.160	11.500	0.250	1.680	5.280	2.400	2.000
74/01/03	15	00							
74/02/04	07	00							
CP(T)-			0.240	14.000	1.360	2.240	7.600	2.450	2.140
74/02/04	15	00							
74/03/04	07	00							
CP(T)-			0.120	11.000	0.820	3.450	7.400	2.400	2.000
74/03/04	15	00							
74/04/04	07	00							
CP(T)-			0.240	9.400	0.074	2.400	8.100	2.500	2.100
74/04/04	15	00							